Notes on the Occurrence and Life History of the Honeysuckle Leafminer, Swezeyula lonicerae, in Hawaii.

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This recent immigrant elachistid moth was first brought to the attention of the entomologists when, in July, 1949, Miss Wilhelmina Tenney brought in branches of the Japanese honeysuckle, *Lonicera japonica,* from her grounds on Makiki Heights, Honolulu, with many dried leaves which Mr. C. E. Pemberton found to be due to a leafminer. Larvae were found in some of the leaf mines, and one moth was reared, issuing August 7. Also, one parasite, *Notanisomorphomyia externa* Timberlake, issued from a mine July 11.

As the moth was so entirely different from any known species of the many lepidopterous leafminers occurring on various native plants, it was at once considered to be a new immigrant pest, and search was made for its possible occurrence in other parts of Honolulu. The host-plant was found to be planted in private and public grounds in many parts of the city. In some of these plantings no evidence of leafminers was found, but in other regions infested leaves were found, often quite abundant.

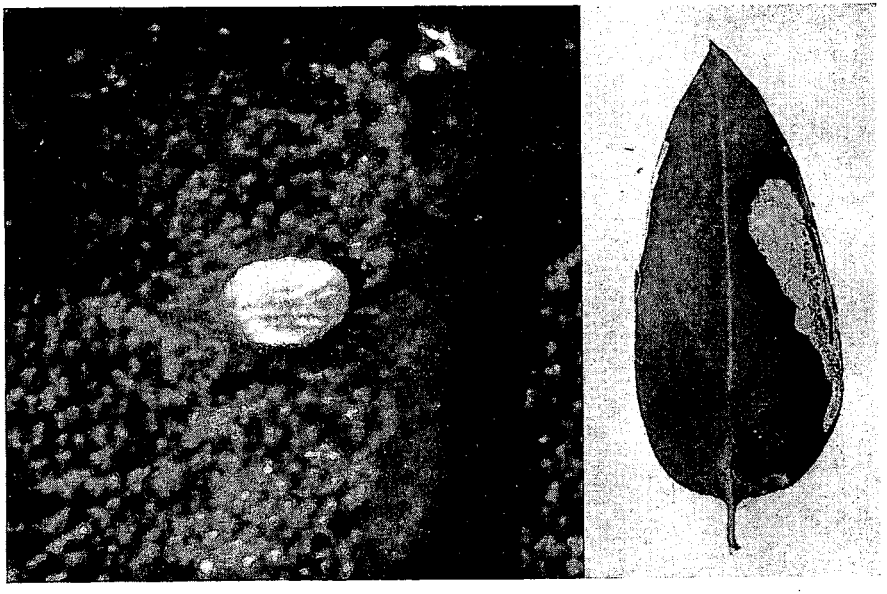


Figure 1.—Left, egg (greatly enlarged). **Right,** mine in honeysuckle leaf.

On August 23, J. S. Rosa obtained abundant material from the waterworks park on upper part of Makiki Street, and more moths were reared. He also reared two specimens of *Zagrammosoma flavolineata* Crawford from this material, which is the first record of its occurrence in Hawaii. Later, Mr. Rosa found this leafminer in honeysuckle in upper part of Nuuanu Valley, and in Pacific Heights, and he and R. H. Van Zwaluwenburg found it up in Kalihi Valley.

October 19, mines were found common by the writer on a patch of honeysuckle vines in the upper part of Woodlawn, in Manoa Valley. Moths were reared, issuing November 9 to 13. November 9, the writer found mined leaves on honeysuckle by the roadside at 2466 Manoa Road, Manoa Valley. Moths were reared, December 4 to 19. One parasite also was reared, *Pseudopheliminus vagans* Timberlake. Then on November 13, a few old mines were found in honeysuckle leaves on the campus of the University of Hawaii in Manoa Valley, but there were no mines containing larvae. On December 4, the writer collected a good number of mines having full-grown larvae, from honeysuckle at the waterworks park in Makiki Valley. Cocoons were formed December 5 to 9 and the moths issued December 25 to 29. This is the extent of distribution of the moth so far as known at present.

There is usually but one mine per leaf, but occasionally a leaf is found with two mines. The mine starts from the place where the egg is laid on the upper surface of the leaf near the margin. The mine is slender, following the margin for some distance, gradually enlarging, and finally producing considerable of a blotch by widening towards the middle of the leaf, often doubling back along the slender part of the mine.

The full-grown larva has a reddish tint. The head is dark and the first thoracic segment has two dorsal wide dark longitudinal bands. It is about 4 to 5 mm. in length, of nearly even width, segmentally crenate along the sides, the thoracic segments only slightly wider. There are four pairs of abdominal prolegs.

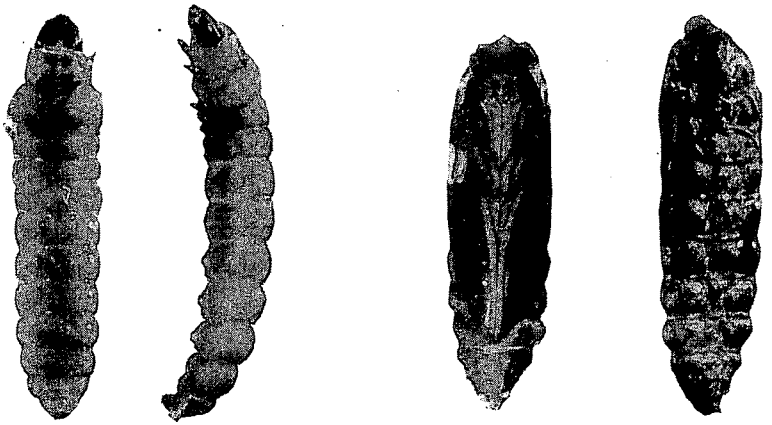


Figure 2.—Left, larva, dorsal and lateral views. **Right,** pupa, ventral and dorsal views.

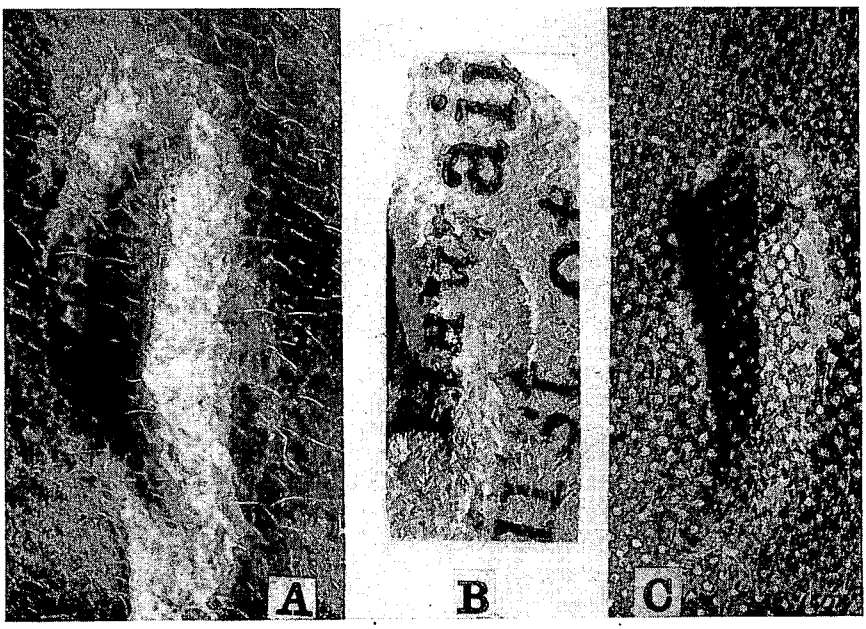
The larva issues from the mine and the cocoon is made on the surface of the leaf or some other object. However, this is not really true, as ascertained by the following observations: The first cocoons that were observed were constructed on leaves in the tin salve box used as a cage. But in another tin box having bits of paper among the leaves, the cocoons were made by preference on the paper. One piece of paper having printing on it was noticed to have the printing on the upper surface of the cocoon without the position of the letters being disturbed. The larva had somehow worked itself beneath the upper fibers of the paper and made its cocoon beneath. Examination of a cocoon on a leaf showed that the cocoon was beneath the epidermis of the leaf, and that the leaf hairs were in natural position. Later, I was so fortunate as to observe a larva in the act of working in beneath the epidermis, which was done without eating or disturbing the inner structure of the leaf. This separation of the leaf epidermis, or the upper layer of fibers of paper, seems to be accomplished by moistening with an exudation from the mouth, possibly saliva-like, or perhaps of some particular chemical substance adapted to the purpose, and allowing for a loosening of this upper layer as the head of the larva is worked in beneath it. As a further experiment, bits of different colored papers having the color only on the surface were supplied for the larvae to make their cocoons in. In all cases the resulting cocoons were beneath the layer of colored fibers of the surface of the paper. In one instance a cocoon made on a bit of newspaper cut from a black advertisement picture, showed the perfect screen pattern on the top of the cocoon. On opening a cocoon it was found that there is scarcely any real cocoon formed, the cavity merely being lined with a slight layer of silk. The cocoon is bulged upward from the surface of paper or leaf, which causes a parting of the surface material leaving an encircling exposed ring surrounding the cocoon. There is a transverse dorsal ridge towards the anterior end of cocoon.

The pupa is about 4 mm. long, of a reddish brown color; the wing cases extend to the fifth abdominal segment; the segments are crenate at the sides and dorsally as in the larva; apex of abdomen is blunt and without attachment to the cocoon. It is not extruded from the cocoon on the emergence of the moth. The pupal stage is about three weeks.

As the first moth was rather tardy in issuing, being about four weeks, it was suspected that there might be a hibernation period in the cocoon, and perhaps an interval before there would be another brood, conforming to adaptation to more temperature latitude conditions, especially as there seemed a likelihood that the moth might have come from Japan. However, it is now apparent that breeding is continuous and not separated into distinct broods. The present indications are that it is not going to become a pest, for in the places where it is found most abundant the honeysuckle vines have a thrifty appearance, and the mined leaves are not very conspicuous, being mostly hidden by the newest growth of vines.

Of the parasites which have been reared from this leafminer, *Zagrammosoma flavolineata* Crawford occurs in southern California, where it has been reared from the potato tuber moth (Graf, U. S. D. A. Bull.

427:35, 1917). *Notanisomorphomyia externa* Timberlake (Proc. Hawn. Ent. Soc., 6:522, 1927) and *Pseudopheliminus vagans* Timberlake (Bishop Museum Bulletin, 31:37, fig. 5, 1926) are in the family Eulophidae. Both are parasitic in several other lepidopterous leafminers in Hawaii. It would seem that they are native species, but I believe that Mr. Timberlake considered them as immigrant species. I do not know of their occurrence anywhere else.



Swezeyula lonicerae

Figure 3-A.—Cocoon on leaf showing the hairs on the top of the cocoon in natural arrangement as on the leaf surface. This is accomplished by the larva forcing its way beneath the epidermis for the purpose of making its cocoon there.

Figure 3-B.—Cocoon on a bit of newspaper with the print showing undisturbed on top of the cocoon.

Figure 3-C.—Black portion of a newspaper photograph showing how the surface has been raised for making the cocoon beneath without disturbing the screen pattern.